SUSTAINABLE DEVELOPMENT GOALS FOR MULTIDISCIPLINARY AND INTERDISCIPLINARY EDUCATION AND RESEARCH IN UNIVERSITIES

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ABSTRACT

The UN Sustainable Development Goal 4 (SDG4) targets to be achieved by 2030, through education, countries should ensure that learners acquire the knowledge and skills for sustainable lifestyles, appreciation of cultural diversity and sustainable development. Implementation of SDG 4 in India will require multi-disciplinary and cross-disciplinary linkages because it will provide learners an opportunity for critical thinking; help in reflective learning; and also help them to develop ethics, and values; develop employability skills. Universities play an important role to achieve the SDGs by 2030 by providing an opportunity for innovation and research; identify the need for multidisciplinary education and research and contribute in preparing graduates with 21st century skills. Further, universities can provide cross-sectional leadership, industry-academia partnerships and collaborations, opportunities for research, dialogue at the national and international level, and provides platforms to various stakeholders like funders, government, society, philanthropists. Universities need to re-think about their role and re-look at the policies and plans that provide and promote such opportunities. The National Education Policy (NEP)-2020 envisages adapting the SGD4 goals with an aim to develop productive citizens for an inclusive and plural Indian society. The fundamental principles emphasised by the NEP-2020 include outstanding research as a corequisite for outstanding education and development. This paper reviews the existing research scenario in IGNOU in the light of the NEP-2020 with the aim of identifying the gap areas, and proposes a framework to develop research competencies in the university. The results of the study are expected to aid the policy makers to take an informed decision on the research needs of the ODL system.

Keywords: SDGs, multidisciplinary, interdisciplinary, education, research, university.

INTRODUCTION

The Open and Distance Learning (ODL) is an innovative system for the educational needs of a diverse group of learners. The traditional system of education may not be able to reach out to the unreached and provide flexible opportunities for higher education. The current scenarios of ever increasing learning needs of the masses, emphasis on creating a self-reliant India, the Covid-19 and post Covid-19 pandemic, and the adoption of the UN Sustainable Development Goal 4 (SDG4), call for an urgent need to restructure the ODL system to meet the educational demands of 21st century , without compromising its quality.

The ODL system, with its wide reach, infrastructure and academic competence, now needs to work towards contributing and fostering quality research and innovation and strive for excellence. In fact excellence in research is the reason why an institution is ranked highly (Nowaczyk & Underwood, 1995).

Developing countries are facing varied multidisciplinary and interdisciplinary, interconnected challenges in various sectors like social, economic and environmental (Sustainable Development Solutions Network & Australian Campuses Towards Sustainability, 2019). The Sustainable Development Goals (SDGs) aims to address these issues through education i.e. SDG 4. SDG 4 gives importance to inclusive, quality and lifelong learning opportunities to all and other SDGs also have direct or indirect relevance to teaching-learning activities at university level (Sustainable Development Solutions Network & Australian Campuses Towards Sustainability, 2019). Indeed Higher Educational Institutions (HEIs) can play a crucial role in overcoming the challenges by adopting innovative strategies (Sustainable Development Solutions Network & Australian Campuses Towards Sustainability, 2019). HEIs have students and teachers from diverse backgrounds and disciplines with diverse capabilities and providing them opportunity for innovation and research which will contribute to achieve SDGs.

HEIs provide opportunity to young talent and encourage creativity and innovation, in turn they help the global community to understand the challenges, opportunities, and relationships between the SDGs; assess and develop policies for implementation, transformation pathways; and monitor progress (Sustainable Development Solutions Network & Australian Campuses Towards Sustainability, 2019). Universities can realize the need for multidisciplinary education and research and make contributions in preparing graduates with critical and analytical thinking. Graduates with a multidisciplinary background can understand and implement the SDGs. HEIs can provide multidisciplinary, interdisciplinary, cross-sectional leadership and be a model in society, and can provide opportunities for the collaborations and forum for dialogue at the national and international level (Sustainable Development Solutions Network & Australian Campuses Towards Sustainability, 2019). In this way universities can provide an innovative and integrated environment to various stakeholders like funders, government and society, philanthropists and academic-industry linkages.

HEIs can contribute towards societal progress through knowledge building, discovery, innovation and research and adopting them. Both traditional and ODL institutions offer research degree programmes and ensure the academic standards of these research programmes. They ensure that national and international guidelines and standards are being implemented for quality assurance and best practices. Support and guidance is provided to students, faculty, supervisors, evaluators and examiners to enable students to complete their research degree successfully and faculty members are provided an environment for research and innovation. The impact of the research carried out in the HEIs is aimed at contributing to the systemic and societal needs (Sustainable Development Solutions Network & Australian Campuses Towards Sustainability, 2019).

Quality assurance mechanisms and standards are put in place by every university and institution which help them to maintain academic standards. The review and monitoring policies of the university and institutions ensure that mechanisms are in place for quality research.. Further, there are many national policies and schemes that help to construct the research ecosystem in a country and support institutional research environments. In India, premier institutions, such as the IITs, research institutions and eminent universities have a thriving environment of research and development that enable these HEIs to provide innovative solutions to the problems of the society (Sustainable Development Solutions Network & Australian Campuses Towards Sustainability, 2019). With the adoption of the National Education Policy-2020 (NEP-2020), the thrust now is on achieving the SDG 4 through holistic and multidisciplinary education, with a strong emphasis on research and development in all HEIs of the country. This scenario calls for revisiting the current scenario of research in the ODL system.

In this exploratory study, a review of the various aspects of research in IGNOU has been carried out with the aim to explore the gap areas and suggest measures to improve through a framework in the light of the SGD4 goals and the NEP-2020.

Objectives

The objectives of this study are to:

- Identify the gap areas of research scenario in IGNOU with respect to SDG4 goals and NEP 2020, and
- Devise a framework for adaptation to meet research needs by the ODL system to meet the SDG4 goals.

METHODOLOGY

To achieve the objectives of this study the qualitative method of analysis of documents was used followed by subjective analysis to design a framework.

Analysis of documents

In this study, the method of document analysis was employed. As an analytical method in qualitative research, document analysis can provide data on the context of research, help tracking change and development, and provide a way to verify findings or corroborate the evidence from other sources (Bowen, 2009). For this study, documents pertaining to National Education Policy -2020, UN sustainable development goals, research in education and the ODL system available on websites were analyzed. Pertinent policy documents, research papers, reports, guidelines and databases were also studied and analyzed.

Assessment using predefined criteria

The research services of IGNOU were assessed in detail for exploring the areas of intervention. The instrument of assessment employed was the Commonwealth of Learning (COL) toolkit (Rama et.al., 2009). The toolkit was developed by experts from twelve Commonwealth countries and UNESCO. It includes international performance indicators for institutions to gauge their own performance. A detailed assessment of IGNOU using the performance indicators in the COL toolkit was carried out using the participant observation method. Since this is a yet unexplored area, there was no precedence of this kind of evaluation of IGNOU. For this, thirteen (13) criteria were selected against which thirty six (36) relevant performance indicators were assessed. As suggested in the toolkit, the performance indicators were applied to the particular context and the performance against each of the performance indicators were recorded after carefully and objectively analyzing evidence from the IGNOU sources, such as Annual Reports, IGNOU Profile, Vice Chancellor's Report, Minutes of the Board of Management, research papers, IGNOU Research Ordinance, and IGNOU Research Policy.

Definition of Research in ODL System

Research is defined in many ways. The Western Sydney University (2020) defines research as the creation of new knowledge and/or the use of existing knowledge in a new and creative way so as to generate new concepts, methodologies and understandings. This could include synthesis and analysis of previous research to the extent that it leads to new and creative outcomes. The Hampshire College (2020) defines research as a process of systematic inquiry that entails collection of data; documentation of critical information; and analysis and interpretation of that data/information, in accordance with suitable methodologies set by specific professional fields and academic disciplines.

The quality of a University is judged by its research performance and research impact. Whereas research performance indicates the research output of the university in terms of publications and enables visibility in global rankings, research impact shows the effect of

the research beyond academia in the social, economic, political and other areas, beyond academia (University of York, 2020).

For the ODL system, we may define research as a systematic study through the ODL mode to advance the knowledge base in the field and implement the findings for social good.

REVIEW OF LITERATURE

(i) Sustainable Development Goal 4 and Research & Education

Globally various challenges related to environment, social and economic issues are being faced by all the countries. Therefore, in 2015, 193 countries agreed to adopt the Sustainable Development Goals (SDGs), which need to be achieved by the year 2030. SDGs will help to end poverty, protect the planet and ensure that all people enjoy peace and prosperity (Sustainable Development Solutions Network & Australian Campuses Towards Sustainability, 2019). The SDGs embrace a universal approach to the sustainable development agenda and emphasize to use creativity and innovation to address developmental challenges. India is committed to implement the Sustainable Development Goals adopted by the UN General Assembly (2015). One of the goals (SDG4) is quality education for all, it aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." (Sustainable Development Solutions Network & Australian Campuses Towards Sustainability, 2019). Higher education is mentioned in target 4.3 and 4.4 of SDG 4 which aims to "By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university and to have relevant skills i.e. technical, vocational for employment, job and entrepreneurship." Higher education also forms an important part of other goals related to poverty (SDG1); health and well-being (SDG3); gender equality (SDG5) governance; decent work and economic growth (SDG8); responsible consumption and production (SDG12); climate change (SDG13); and peace, justice and strong institutions (SDG16) (Sustainable Development Solutions Network & Australian Campuses Towards Sustainability, 2019).

The SDGs cover a wide range of social, economic and environmental challenges therefore education, innovation, creativity and research is essential to address these issues. Therefore universities can play a key and crucial role to address the issues and challenges ; they can develop new partnerships, collaborations for education, research and funding (Sustainable Development Solutions Network & Australian Campuses Towards Sustainability, 2019). A study by Purcell, et al (2019) emphasized the role of higher education institutions i.e. they can help to tackle challenges related to SDGs, and facilitate equality in the world. However, it is being observed that sustainability is neglected and mainstream subjects are given importance, and therefore, universities struggle to integrate sustainability into their governance and working models. This study gave an insight into approaches a university might adopt to deliver towards SDGs and connect universities across institutions and communities it serves. Study concluded by emphasising that university should align its vision/mission with SDGs. To be able to fulfill this objective universities can adopt a living lab model or inoculation centres that can bring various research projects under one framework, and bring teachers and students closer to tackle the problems through experiential teaching and learning and/or research and projects within the university or with external partners. Another study highlighted that universities can contribute towards SDGs, in various sectors like gender, water, sanitation, health, innovation infrastructure etc., (Bhomik et al (2020). Universities can provide innovative solutions and policy options to implement SDGs and overcome the challenges. It is vital not only to include SDG-related contents in the curricula, but also to use action-oriented transformative pedagogy and encourage research for creativity and innovative solutions.

(ii) National Education Policy-2020 and Research & Education in India

Ensuring the achievement of SDG 4, in India, the Ministry of Education (formerly MHRD), Government of India, came out with New Education Policy (NEP-2020) in August, 2020 (Development, 2020). The NEP 2020 envisions the education system of India to be rooted in Indian ethos and transform India into an equitable, vibrant knowledge society. The NEP 2020 envisages quality education, innovation, creativity and research to make India a knowledge hub that provides opportunities to the students to be ready with 21st century skills.

The NEP 2020 emphasizes that education should move towards less content but more critical thinking and problem solving; to be creative, innovative and multi-disciplinary and flexible. Pedagogy must evolve experiential, holistic, integrated, inquiry-driven, discovery-oriented, learner-centred, discussion-based, flexible, and, of course, enjoyable. The curriculum must include basic arts, crafts, humanities, games, sports and fitness, languages, literature, culture, and values, in addition to science and mathematics, to develop all aspects and capabilities of learners; and make education more well-rounded, useful, and fulfilling to the learner. Education must build character, enable learners to be ethical, rational, compassionate, and caring, while at the same time prepare them for gainful, fulfilling employment. New technologies involving artificial intelligence, machine learning, block chains, smart boards, handheld computing devices, adaptive computer testing for student development, and other forms of educational software and hardware will not just change what students learn in the classroom but how they learn, and thus these areas and beyond will require extensive research both on the technological as well as educational fronts (Ministry of Human Resource Development, 2020).

Creation of HEI clusters has been advocated in the NEP-2020 to create a conducive environment for high quality research and education in multidisciplinary and cross-disciplinary fields. HEIs will focus on research and innovation by setting up start-up incubation centres; technology development centres; centres in frontier areas of research; greater industry-academic linkages; and interdisciplinary research including humanities and social sciences research. Given the scenario of epidemics and pandemics, it is critical that HEIs take the lead to undertake research in areas of infectious diseases, epidemiology, virology, diagnostics, instrumentation, vaccinology and other relevant areas (Ministry of Human Resource Development, 2020). PhD students will also have a minimum number of hours of actual teaching experience gathered through teaching assistantships and other means. (Development, 2020). The NEP-2020 also envisions catalysing quality research in all fields through the National Research Foundation (NRF).

Recently, the UGC has come up with a Guidance document on Good Academic Research Practices. This document underlines the value of underlying research integrity and suggestive in nature at each step of conducting research. The release of the document is timely and reflects the focus of the NEP 2020 on excellence in Research. Ethical considerations in research being one of the most important challenges, the document has dealt with values such as Ethics, Rigour, Relevance, Independence, Transparency, Accountability, impartiality and Respect as underlying principles of Academic integrity (Document, 2020).

(iii) Agencies facilitating Research and innovation in India

In India, apart from Universities, Educational Institutions and Research Laboratories that provide the research infrastructure, there are many public and private agencies that facilitate through infrastructure as well as through funding. The public agencies include the various Ministries of Government of India, including the Ministry of Education (MoE, 2020) and Ministry of Science and Technology (MST, 2020). These ministries have several schemes that provide funds through their associated departments. The private organisations and private individuals in India usually fund the projects at the IITs. Recently the Govt of India has brought our several policies that aim at nurturing a conducive

environment for research in universities, such as the National Innovation and Startup Policy for Students and Faculty (MHRD, 2019). This policy envisages building an innovation ecosystem in HEIs that contains elements of intellectual Property ownership management, technology licensing and institutional Startups. The policy envisages faculty start-ups where the faculty member could be an owner/ direct promoter, mentor, consultant or as on-board member of the startup.

The Government of India plans to set up the National Research Foundation (NRF) to boost research and innovation in all disciplines in the country. It is envisioned to provide research funding in all disciplines and aims to recognise successful research outcome and provide linkages with government agencies, industry and philanthropic organisations.

(iv) Research Quality Indicators in HEIs

A review of literature showed that research in universities brings in quality in teaching and learning outcomes of students (Health, 2016). Many studies highlighted the benefits of research-led-teaching, as this brings in and integrates the experience of the researcher into teaching (Health, 2016). Integrating case scenarios and incorporating research at under-graduate level helps in creating interest in teaching-learning and developing research and innovation culture in universities/institutions. This may include undergraduate and graduate projects, doctoral degrees which may further lead to large collaborative projects and collaborative research projects carried out by teachers, academics and researchers of the University with external stakeholders. Research may be systemic or discipline-wise, or qualitative, quantitative or having multiple methodologies. Research may be within a single discipline or be multidisciplinary. It can be undertaken within a country or elsewhere in the world (At et al., 2017).

It is important that research undertaken by the HEIs should have a purpose to benefit the society and should meet guidelines and standards for research and publication ethics. The HEIs should therefore develop a rigorous system to maintain research standards with integrity at all stages of research, ensure research is conducted as per guidelines, protocols and ethical framework; there is a culture of integrity and transparency, and fair processes are followed in the institution for governance and monitoring of research. In broad terms, Research Governance is a framework of policies, practices and procedures which (At et al., 2017):

1. Sets minimum standards for the University's research activities and research environment;
2. Defines the mechanisms needed to deliver those standards; and
3. Describes the monitoring, assessment and auditing arrangements to ensure compliance with those standards

Another study in 2016, suggested that HEI should build a robust research program and long-term research plan with short-term and long-term objectives. The following activities are key in building such a plan (Health, 2016):

1. Assessing and reviewing research activity,
2. Defining and refining research focus,
3. Developing a talent recruiting, recognition, and retention plan,
4. Driving collaboration to improve and extend research impact,
5. Deploying infrastructure and resources, and
6. Developing a comprehensive funding plan

As per study in 2016, the research quality indicator of HEI is established on the basis of its research performance and impact of research on society. This study highlighted five main research quality indicators of an institution as follows (Kosten, 2016):

1. General science policy,
2. Funding allocation,
3. Management and organization,
4. Content decisions, and
5. Consumer information.

In India, the National Assessment and Accreditation Council (NAAC) emphasis and give weightage to research, innovations and consultancy as one of the criteria of assessment and quality of HEIs. This criterion helps to evaluate the research culture of an institution. There are seven indicators of research quality as per NAAC (NAAC, 2019). These are:

1. Promotion of Research and Facilities
2. Resource Mobilization for Research
3. Innovation Ecosystem
4. Research Publications and Awards
5. Consultancy
6. Extension Activities
7. Collaboration

From the above discussion, it becomes obvious that to foster a high quality research culture in HEIs, universities and institutions should focus on the establishment and development of multiple dimensions, i.e., research policy, infrastructure, human resource, administration, funding, teaching and research, and innovation ecosystem. Enabling these parameters and maintaining these will help the institutions to improve and excel in the long run.

(v) Research at IGNOU

IGNOU offers discipline based research i.e. PhD programme in forty two disciplines and MPhil (till 2019) programmes in ten Disciplines for its students. And Systemic based research is carried out by different regional centres/divisions/units of the university by the academic staff of IGNOU.

a. Life cycle of PhD Students

Life-cycle of a research scholar will give a vision about IGNOU institutional processes for a research degree programme for PhD scholars. Therefore it is important to understand the life-cycle of PhD scholars enrolled in IGNOU. Various phases of the life cycle of a research student at IGNOU are pre-admission activities, provisional admission, induction, course work, course work examination, final admission process, protocol approval, research work, paper presentation and paper publication and progress report submission, thesis submission and viva voce. The research process followed by a PhD scholar is as follows: The students review the literature and finalize the synopsis along with tools, format and presentation for the doctoral committee and institutional ethics review board (IERB) , for the suggestions and approval. After the IERB, doctoral committee and Research Council approval, students finalize the tools and test reliability and send tools to experts for validity. Then pilot study is conducted to test the tools and present the findings to the doctoral committee. Progress report is submitted by the student every six months and the same is presented once in a year. During the tenure of the study, the students attend seminars/conferences and publish papers related to their study.

b. Research by IGNOU Faculty

Various divisions/units of the IGNOU, such as Staff Training and Research Institute of Distance Education (STRIDE), Planning and Development Division (P&DD), and National Centre for Innovation in Distance Education (NCIDE), carries out systematic research.

STRIDE is involved in systemic research for development of the ODL system including identifying training needs in ODL. It also promotes individual, team and institutional research in ODL at fundamental, experimental and application level, and provides consultancy services to Government, non government and private organizations and universities. It provides a platform to the national and international stakeholders to share their ideas on ODL through Indian Journal of Open learning (IJOL). The Planning and Development Division of the university brings out statistical analysis and various other publications for dissemination and decision making. The University also carries out systematic research through programme evaluation of various programmes on offer in order to improve them. The NCIDE carries out systematic research that identifies gap areas in the system and also proposes innovative interventions. The Regional Services Division also carries out systematic research to devise solutions specific to their problems.

(vi) Research Policies of IGNOU

IGNOU has a research policy for the Research Degree Programme offered to the PhD and MPhil students. It also has a policy for systemic research for its faculty members.

c. Research Ordinance for conducting Research Degree Programmes

The Research Ordinance and Regulations have been enacted for MPhil and PhD Research Degree Programmes (IGNOU, 2019). These focus on both theoretical and empirical research in various academic disciplines and interdisciplinary areas. IGNOU offers (M Phil/ Ph D) in 42 Disciplines across its 21 Schools of Studies in regular mode in compliance with UGC (Minimum Standards and Procedure for award of M Phil /Ph D Degree) Regulations 2016. The main objective of the Research Degree Programme is to maintain a strong focus on the flow of theoretical ideas and to connect it with the empirical works of subject oriented researches in Sciences, Social sciences, Humanities, Management, Agriculture and other disciplines offered by the University as areas of probe and investigation from time to time.

d. Policy on systemic research

System-based research is an important activity of the University for which mechanisms are developed that integrate research in the mainstream activities (IGNOU 2020). The University encourages systemic research with the following objectives:

- Impact analysis of the functioning of the Open University vis-a-vis its mandate, vision and mission;
- Undertake in-depth studies for evaluation of distance education programmes, their impact and effectiveness with a view to undertake corrective measures in their implementation;
- investigate specific problems with regard to the concepts and practices pertaining to the system and to find solutions to them;
- Study the adoption of new technologies, such as Open Educational Resources (OERs), Massive Open Online Courses (MOOCs), and mobile devices and their application, etc., with the objective to reach out to large sections of the society, particularly to the disadvantaged, marginalized and hitherto unreached.

An analysis of the decisions taken by the Research Council, as mentioned in its Minutes, has revealed certain gap areas in research at IGNOU with respect to research degree programmes. These areas range from maintaining quality in PhD admission, identification of thrust areas of research in different disciplines, academic and research support to students, training in research methodology in ODL in course work, procedures to be followed during research process, systemic research, need for scaling up of the existing research infrastructure, among others (Minutes of the Meetings of the Research Council

held on 22-05-2002, 10-02-2004, 13-01-2005, 23-06-2009, 28-12-2010, 23-03-2012, 07-06-2013).

RESULTS AND DISCUSSION

1. Identification of steps of research undertaken by student at IGNOU

Table 1 presents the steps undertaken by a research scholar during their tenure of pursuing Research Degree Programmes. As can be observed from the table the major steps include pre-admission, admission and post admission activities that the student carries out through interaction with the university, most prominently the Research Unit and the School of Studies. The student attends the induction programmes and various workshops organised by the Research Unit to become aware of the regulatory framework, obtain various updates and receive training in research methodologies.

Table 1. The Steps Undertaken By Student at IGNOU

S No	Step	Details
1.	Pre-admission activities	1. IGNOU advertises for the vacant seats and details for PhD admission in July every year on the basis of predetermined seats available in each Discipline. The admission forms are available at the IGNOU/ National testing Agency (NTA) website. 2. Prospective students fill up online admission forms available at IGNOU/NTA website. No offline application is entertained.
1.	Admission	1. Student applies online for PhD/ M Phil Student takes online entrance examination 2. Result Declared with 50% as cut off for General and 45% for SC/ST/OBC and PWD candidates (70 % weightage is given to performance in entrance test) 3. Eligible candidates called for interview at specific school as per merit list (30% weightage to Interview) 4. Interview conducted by discipline specific admission committee and result declared 5. Student gets offer letter from Research Unit and sends acceptance 6. Student submits documents and fee and provisional admission is done
2.	Induction training	Student undergoes induction training by Research Unit
3.	Course work	(i) Student completes Course work of 16 credit within 2 semesters (maximum) from date of commencement of academic session (ii) TEE taken by student after course work and registration
4.	Allotment of Supervisor and Research Topic	Student allotted supervisor and Topic of Research as recommended by DRC/ School Board and final approval by Research Council/ Research Council Standing Committee
7.	Research Work by Student	1. Students finalize the synopsis and present for approved by doctoral committee 2. Present for ethical clearance - IERB and include suggestions 3. Inform DRC and RU if any changes and take approvals 4. Progress report submitted by student every 6 months signed by student and supervisor 5. Seminars 6. Paper writing

| 8. | Submission of Thesis and Viva Voce | 1. Pre-submission
2. Anti-Plagiarism report
3. Final submission
4. Presentation
5. Viva voce |
| 9. | Award of Research Degree | Research Degree awarded to student by SED during convocation |

2. Identification of steps of Research Degree Programmes undertaken by IGNOU

Table 2 presents the various activities that are undertaken for the Research Degree Programmes at IGNOU. The Research Unit is the nodal unit to oversee the operations and to coordinate the activities of the Research Degree programmes. Starting from the pre admission activities to award of Degree , the activities pertaining to advertisement of vacancy of seats, preparation of information bulletin, coordination with examining bodies and Schools, coursework, evaluation, submission of Thesis, progress reports, conduct of *viva voce* , and disbursement of Fellowships are carried out by Research Unit.

In the respective Schools, the supervisor plays a very important role in mentoring the scholar and supervising the progress, quality of research work. Once the supervisor is allotted, students discuss details of the research proposal with the supervisor, they plan a course of action and conceptualize the research problem. Supervisor guides the student to make a time table for completing activities. They identify the resources and review of literature and supervisor helps students to complete synopsis, present and help to defend the proposal. Guides the students to complete pilot study and main study, analyse and interpret findings and write the chapters and give feedback. Supervisor interprets the anti-plagiarism report; helps students to publish papers and encourages them to attend conferences/seminars. Supervisor provides academic and personal support so that students can complete and submit thesis and defend their work during viva voce.

Table 2. Steps Undertaken By IGNOU Faculty For Research Degree Programmes.

S No	Step	Details
1.	Pre-admission activities	1. Research Unit, IGNOU advertises for the vacant seats and details for PhD admission in July every year. 2. Setting the entrance test paper and sending it to the examination conducting body National Testing Agency (NTA) by Student Evaluation Division (SED). 3. Names of Moderation team members sent to NTA by SED through Research Unit 4. NTA announces last date and entrance examination date 5. Screening of the admission forms available at NTA website
2.	Admission	1. Conduct of entrance test. 2. Online examination and result declared and students notified for interview 3. Notify date for interview at specific school as per merit list 4. Interview conducted by discipline specific admission committee and result declared 5. Send offer letter by Research Unit and receive acceptance from student 6. The Research Unit received relevant documents and fees from students and finalized provisional admission.
3.	Induction training	Research Unit conducts induction training for the student
4.	Course work	1. School organizes coursework and examination after course work

		2. School carries out paper setting, moderation, evaluation of answers scripts by approved evaluators 3. Student Evaluation Division (SED) conducts examination after course work and declares result
5.	Allotment of Supervisor and Research Topic	1. School allots supervisor through Doctoral Committee and School Board approvals 2. School finalises topic through Doctoral Committee and School Board approvals
6.	Research Work by Student	1. Mentoring by Research Supervisor 2. RU monitors progress, grievances, examiner data 3. RC/RCSC Meetings 4. Progress report by student every 6 months signed by student and supervisor
7.	Submission of Thesis and Viva Voce	1. Pre-submission 2. Final submission 3. Presentation 4. Viva-voce
8.	Award of Research Degree	Research Degree awarded to student by SED during convocation

3. Identification of steps of research projects undertaken by faculty

The systemic research projects undertaken by the faculty are generally in-house. The steps taken are as follows:

1. Preparation of research proposal: Faculty identifies a problem area and carries out a background research. Thereafter a well-structured proposal is written.
2. Approval from the competent authority: The proposal is submitted to the competent authority for approval.
3. Conduct of research: Research is conducted using various tools.
4. Publication of Results: The results are published and disseminated among stakeholders.

4. Identification of indicators of quality research in ODL system

This study identified ten prominent indicators that a ODL institution must have to carry out quality research (Table 3).

Table 3. Indicators of an ODL Institution carrying out Quality Research

S No	Indicator	Description
1.	Comprehensive Research Policy	Research policy, IPR, Ethics, Innovation and Start-ups for both students and faculty
2.	Research Funding	Budgetary allocations, Close collaboration with funding agencies
3.	Research Infrastructure	Laboratories, Libraries, ICT software, Internet
4.	Academia-Industry linkages	Collaborations, MoUs for research infrastructure and commercialization of successful research products
5.	Network of HEIs	Knowledge and technology sharing
6.	Multidisciplinary and cross-disciplinary research	Combine expertise, collaborations for academic exchange
7.	Systemic Research	Visible implementation of successful research results for quality development of the University
8.	Discipline-wise Research	Presence of varied disciplines of research in the University

9.	**Promoting creativity and innovation**	**Incentives through recognition, rewards, monetary grants**
10.	**Monitoring and Feedback**	**Periodic monitoring of research studies by higher authorities of the university, Research progress reports to higher authorities**

5. Identification of gap areas in Research in IGNOU

The results of evaluation of the institution brought into light three criteria standards (with zero score) that were considered as gap areas at IGNOU. The three criteria standards had six performance indicators. All the six performance indicators were selected for the subsequent development of a framework.

Table 4. Criteria and Performance Indicators for Research Framework

S No	Criteria	Performance Indicator
1.	10.4 There are relevant mechanisms and procedures to monitor and evaluate research within the institution.	10.4.5 The institution encourages systemic research in ODL and the results feed into the improvement of the system.
2.	10.6 The institution is responsive to community needs and conducts relevant extension and awareness programmes.	10.6.2 Community work undertaken by learners is recognized by the institution in fulfillment of graduation requirements.
3.	1.4 The policy and planning are supported by need analysis, research inputs and stakeholder consultations	1.4.1 The institution assigns responsibility for conducting systematic research and evaluation of its performance and for communicating the results to senior management and key stakeholders
4.	1.4 The policy and planning are supported by need analysis, research inputs and stakeholder consultations	1.4.2 The policies of the institution are based on and regularly reviewed in the light of the institutional research data.
5.	2.23 The institution encourages innovation and creativity among different constituents	2.23.1 The institution's policies and resource allocation procedures encourage innovation and creativity.
6.	2.23 The institution encourages innovation and creativity among different constituents	2.23.2 The institution recognizes the good work done by the staff through incentives, rewards, special awards and monetary grants.

Proposed Implementation Framework

Based on the above review and analysis the following implementation framework for research quality improvement of IGNOU is proposed (Figure 1). There are three major components of the framework. These are (i) Comprehensive research policy (ii) Developing a culture of research, and (iii) Dissemination of knowledge and technology. These components are described below in brief:

Figure 1. Proposed implementation framework for research quality improvement of IGNOU

(i) *Comprehensive research policy*: An all encompassing and broad research policy for IGNOU needs to be put in place aiming at achieving the sustainable development goal-4. The policy should include the elements of basic and applied research, and multidisciplinary and cross disciplinary research. It should be all encompassing, taking under its purview the areas of IPR, ethics, innovation and start-ups.

(ii) *Developing a culture of research*: A culture of research should be fostered at the university. Excellent research infrastructure, research grants and funds, academic-industry linkages, consultancies, and recognition for good research should be put in place.

(iii) *Dissemination of knowledge and technology*: The successful research results should be implemented. The results of systematic research should be implemented by the university to improve the quality of its services. The results of basic research should be disseminated through publications, seminars, conferences etc. The results of applied research should be suitably marketed and transfer of technology should be done. Collaborations with industry and society outside the University should be encouraged to bring in more socially relevant projects in the university.

CONCLUSION

In the present scenario, with the imperative to achieve the Sustainable Development Goal 4 and the National Education Policy emphasising on quality research, the ODL institutions need to rise to the occasion. This study has explored the existing research scenario in the world and India, and the ODL system with a view to propose suitable measures to improve the quality of research in the ODL system. This paper elucidated the steps taken by a research scholar and the University to offer Research Degree Programmes, to better understand the research process and identify the areas of intervention. The study used the COL guidelines meant for the various areas of improving research in the ODL system, and used it to analyse an ODL institution with a view to identify the indicators of a ODL institution carrying out good research. Further, through literature review, this paper analysed and identified more indicators. Based on this analysis, ten indicators were selected, defined and proposed to be included appropriately to design and propose an implementation framework for the ODL system. The framework has three components, namely (i) Comprehensive research policy (ii) Developing a culture of research, and (iii) Dissemination of knowledge and technology. The proposed framework after due adaptation should be tested on pilot basis followed by due validation and implementation. This framework, when adopted, is expected to bring in the necessary change towards quality improvement in research in the ODL system. This will enable the ODL system to help the country achieve the SDG4 and meet the needs of the NEP-2020.

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